



Arboretum classes indoors and out-of-doors. ABOVE: Members of the plant propagation class conducted by Mr. Fordham take over the work areas of the Dana Greenhouses at the Thursday evening and Saturday morning classes. BELOW: Maples in flower may not be spectacular, but Dr. Nevling takes time to explain the taxonomic and horticultural characteristics of the plants in an Arboretum class.

treated plants. Some diploid mutants showed cytological disturbances at diakinesis associated with a premature fractionation of the nucleolus. These will be studied for possible evidence of chromosome changes in the mutants.

The development of information on the technique of germinating seeds of woody ornamental plants has produced many seedlings which are considered expendable in a variety of additional experiments. Colchicine has been applied to a number of these to observe the nature and frequency of changes induced and to determine the possible horticultural value of plants so influenced. Seedlings of 12 species were treated with 0.5 per cent colchicine in lanolin and kept for seven days under 250 watts of infrared light at temperatures of 60 to 80 degrees F. and in high humidity. An equal number of seedlings without colchicine treatment were raised in the same environment as control plants. Following the infrared light treatment all plants were raised in normal greenhouse environment. Nearly every lot of untreated seedlings showed some reaction to the infrared light, most often the plants died. The loss was particularly severe in the seedlings of *Cornus kousa*, *Magnolia obovata* and *Tsuga caroliniana* suggesting further work on infrared effects on germination and seedling development is essential. The colchicine treated seedlings showed phenotypic variation from stunted growth habits to plants of exceptional vigor. Polyploidy is suspected in five of the 12 species tested. Verification will come when the plants are larger and chromosome counts can be checked.

Chromosome counts are made routinely on much of the material processed in the greenhouses or grown on the grounds. Counts are recorded on voucher herbarium sheets as well as on the record cards of the taxa. During the year Dr. Sanders obtained a preliminary chromosome count from root tips of seedling *Austrobaileya*, the first record known to us for that genus. Chromosome counts were also made in association with research projects on species of *Prinsepia* and on the dwarf seedlings developed from witches' brooms of *Pinus strobus*.

The existence of a triploid plant of *Forsythia* has been questioned recently in literature from Europe. A re-examination of all plants labelled *Forsythia* 'Beatrix Farrand' in our collection, as well as additional material received from nurseries under that name, has revealed all plants to be tetraploid. Since the original chromosome count was made and verified by competent cytologists it is possible either that only a single shoot showed this abnormality or that the triploid plant has been lost. Any suggestions of sources of the original plants distributed as triploid *Forsythia* 'Beatrix Farrand' will be welcomed.

Mrs. Rudenberg has continued her cytological studies of taxa of *Lonicera* in a systematic examination of plants in the living collections of the Arboretum. To the present, chromosome counts from 72 plants in 30 different species have been obtained. The species of *Lonicera* appear to be predominantly diploid,  $2n = 18$ . There are relatively few polyploids in the genus, yet some species have indistinguishable diploid and tetraploid forms. Many taxa have been counted for the first time and tetraploid

forms have been found in varieties of species previously considered diploid.

Dr. Nevling has obtained chromosome counts from several species of tropical plants important to work in progress in Puerto Rico.

### Education:

Two formal courses in Harvard College were offered by members of the Arboretum staff during the year. Dr. Howard taught a new course, Biology 209, The Phylogeny of the Flowering Plants. During the mid-semester vacation the class travelled to a field location in Puerto Rico and, with the assistance of Dr. Wood, spent a week in closer examination of many families limited to the tropics. In the spring semester Dr. Wood and Mr. Green taught Biology 103, an introductory course, The Taxonomy of Vascular Plants. A special financial arrangement was made with the Department of Biology permitting this cooperative effort.

Graduate students, undergraduates, special students and Mercer Fellows worked with several staff members for guidance and in the development of special problems in taxonomy or in horticulture. Most of the staff attended and participated in the seminar series on plant taxonomy held in the Harvard University Herbarium building.

The informal classes offered without academic credit to the general public were conducted in Jamaica Plain and in Weston. The fall field class, with emphasis on horticultural practices, was conducted by Dr. Wyman in Jamaica Plain. Dr. Sanders led the class in Weston, considering some of the cytogenetical problems of plant populations in the wild and under cultivation. Mr. Fordham again taught a class in plant propagation which met at appropriate intervals for the work to be done throughout the year. In the spring, the Weston field class was held on Tuesday and Thursday evenings between 6 and 7 P.M. interesting a different group of people than had come for the afternoon classes. Dr. Howard, with the special assistance of Dr. Hartley and Mr. Williams, was responsible for the classes. In Dr. Wyman's absence, the spring field class in Jamaica Plain was led by members of the staff and it, too, was held at a different time, Saturday morning. The new audiences coming to the classes held at different times suggests that varying the days of the classes every few years may make them of greater value to a larger number of people.

Several special programs were arranged to meet specific requests. Mr. Fordham conducted a workshop on the germination of woody plant seeds in the Dana greenhouses for guests of the Massachusetts Horticultural Society. Dr. Dudley participated as a guest instructor in a course offered and sponsored by the Massachusetts Department of Education at the State College in Boston. The course, entitled "Environment for Living," considered open spaces and recreational areas. Two laboratory sessions for the students were arranged at the Arnold Arboretum. The group hopes to conduct a survey of the street and park trees of greater Boston as a basis for recommendations for city beautification programs.

The facilities of the Arboretum came into use for many visiting groups of horticulturists and nurserymen, as well as for classes from New England

colleges. Again this year, the judging and identification contest of the University of Massachusetts, the Massachusetts Department of Agriculture, and the Boston Public Schools was held in the Administration Building. The staff also made arrangements for the mid-winter meetings of the Northeastern Section of the American Society of Horticultural Sciences which were held in the Biological Laboratories.



The participants in the discussions of botanical nomenclature preceding the X International Botanical Congress in Edinburgh, Scotland. The meetings were held in the botanical lecture hall adjacent to the new herbarium and library building shown in the photograph. Jalmar photograph.

The staff was represented at sessions of the Nomenclature Section and the remainder of the X International Botanical Congress at Edinburgh by Drs. Howard, Hu, Nevling, Schubert, and Wood, and Mr. Green. Dr. Sanders attended the AIBS meetings in Colorado. Drs. Howard and Wyman attended the meetings of the AABGA at Planting Fields Arboretum which were held in association with the American Horticultural Congress. The American Horticultural Society, in cooperation with Colonial Williamsburg, sponsored the annual Williamsburg Garden Symposium this spring. Dr. Wyman presented a program on low maintenance gardening and the plants which make it possible. Mr. Fordham attended the International Plant Propagators' Society meeting at Rochester, New York. He spoke there and at the regional meeting of the Federated Garden Clubs at the Waltham Field Station.

During Dr. Wyman's trip to Europe this spring he has been asked to speak and often to describe the activities, facilities, and resources of the Arnold Arboretum. These meetings included those of the International

Dendrological Union, the Scottish Garden Society, and the International Camellia Society.

### Exhibits and Displays:

For the first time in a number of years the Arboretum did not participate in the Spring Flower Show of the Massachusetts Horticultural Society. Impending changes in the physical plant necessitated commitment of labor and the requirements of greenhouse space for research materials and experiments in progress did not permit the forcing of trees and shrubs in time for the Spring Show. A demonstration of mulching materials similar to that shown at the Massachusetts Spring Flower Show last year was exhibited for the 19th American Horticultural Congress held in the Commodore Hotel in New York in September.



Opening Plenary Session of the X International Botanical Congress held in Usher Hall, Edinburgh, Scotland, August, 1964. Jalmar photograph.

Open houses were held in Weston and in Jamaica Plain during the spring. The Massachusetts Horticultural Society, in awarding a gold medal to the Arnold Arboretum, requested our participation in a program of open gardens of award winners. For this two-day activity the staff prepared special exhibition cases, including new kodachrome transparency displays and demonstrations relating to plant exploration, the preparation of herbarium specimens, and techniques of plant identification.

Mr. Heman Howard prepared a special set of display photographs of the Larz Anderson collection of *bonsai* of the Arnold Arboretum. The set of photographs, showing individual specimens, as well as the methods of housing and displaying the *bonsai*, is available on loan. During the year these photographs were displayed for a special exhibit of the Garden Club of America in the Goldsmith Civic Garden Center in Memphis, Tennessee.

Dr. Hu prepared and exhibited a colorful demonstration concerned with

the lines of evolution in the genus *Ilex*, the hollies, at the X International Botanical Congress at Edinburgh.

### Travel and Exploration:

The X International Botanical Congress in Scotland afforded staff members attending the opportunity of taking part in tours to various botanical gardens and of visiting herbaria and botanical institutions. Mr. Green worked at the herbaria of Kew and the British Museum (Natural History) both before and after the Congress. Dr. Howard travelled to Denmark, Germany, France, and Belgium following the Congress, visiting gardens and herbaria in each country before returning to the institutions in London en route home. Dr. Hu received a special grant from the research funds of Sigma Xi which permitted her to study material of *Ilex* in herbaria in London and Edinburgh, as well as Munich, Vienna, Berlin, Göttingen, Leiden, and Brussels. Dr. Nevling received a travel grant from the National Science Foundation through an award committee of the American Institute of Biological Sciences which enabled him to observe curatorial procedures at the major herbaria in England and Scotland, the Netherlands, and France. Dr. Schubert worked in the herbaria in London, and in Edinburgh during the Congress. Dr. Wood made an extensive trip through Europe before the Congress visiting gardens in Italy, Germany, Austria, France, and Switzerland and making photographs of plants to be used in his course in plant taxonomy. He examined material in the herbaria in



Field work in the Luquillo Mountains in eastern Puerto Rico. Sir George Taylor, Director, Royal Botanic Gardens, Kew; Dr. Richard Howard; and Mr. Roy Woodbury, of the University of Puerto Rico. October, 1964. From a Kodachrome by Anstiss B. Wagner.

London, Paris, Geneva, and Copenhagen, and solved many problems which had arisen from his studies of the flora of the southeastern United States.

Drs. Howard, Nevling, and Wood made trips to Puerto Rico in programs of teaching and research. Materials for anatomical and cytological studies were collected as well as specimens for special illustrations. Dr. Howard attended a meeting of the Council of the Association for Tropical Biology in Caracas, Venezuela. With the cooperation of botanists of the Instituto Botánico materials for petiolar studies were collected in the Parque Henri Pittier and in the Botanical Garden.

Mr. Hosmer was able to collect material of plants worthy of trial in the Boston area in several locations in Afghanistan.

During the spring and early summer of 1965 Dr. Wyman is spending several months in Europe to obtain plants thought to be new to the United States and to be hardy out-of-doors at the Arnold Arboretum. These plants have been sought from the native floras, as well as in introduced and cultivated collections in botanic gardens, arboreta, private gardens, and nurseries.

The Arboretum has agreed to share the expenses of several expeditions or to purchase herbarium collections or seeds from botanists of other institutions. During the year support was afforded expeditions in Turkey, Guatemala, Puerto Rico, South Africa, and Western Australia.

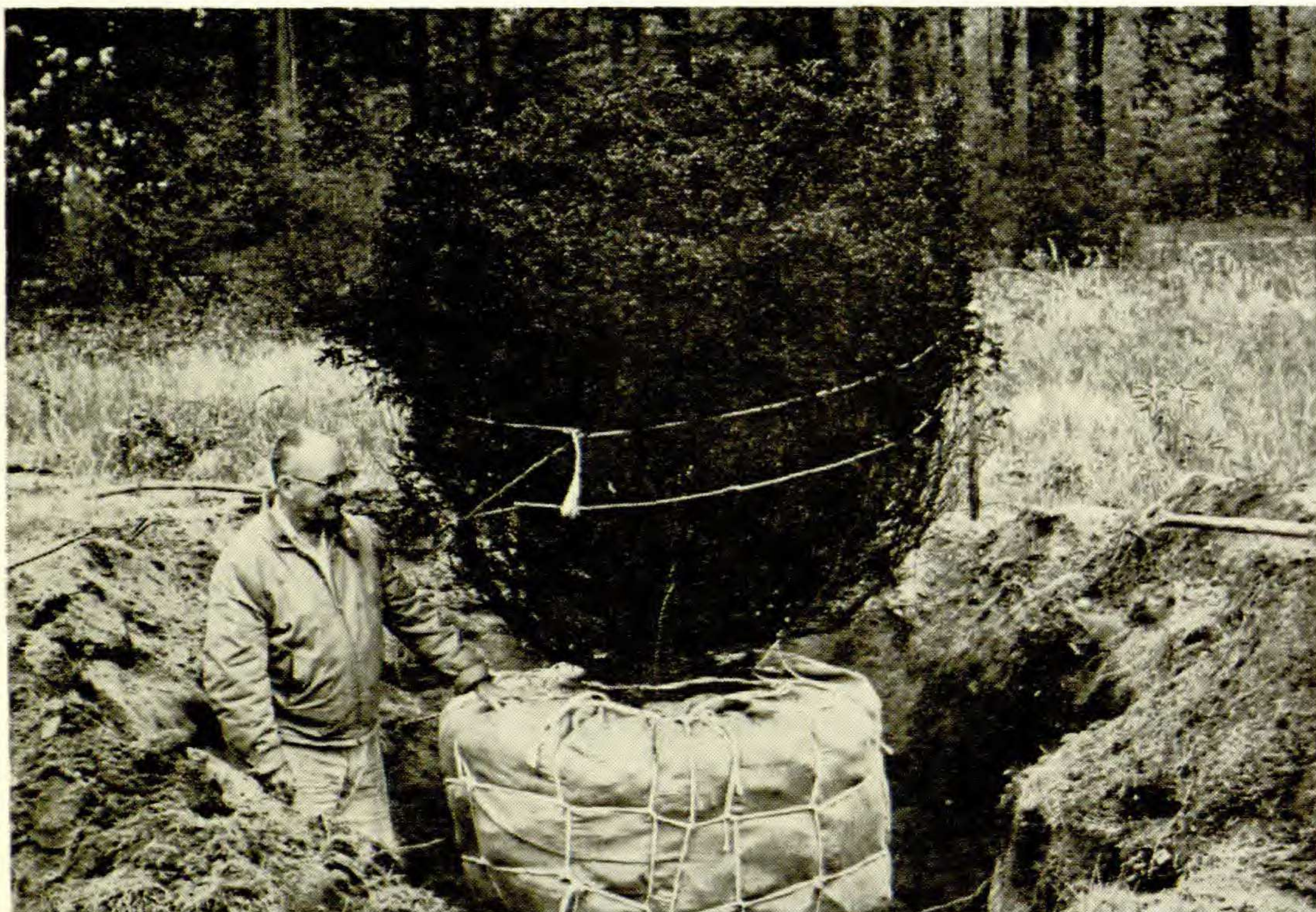
#### **Gifts and Grants:**

During the fiscal year 1963-64, property belonging to the Bussey Institution was taken by the Commonwealth of Massachusetts by right of eminent domain. On this property were the old buildings forming the greenhouse complex of the Arnold Arboretum. The value of the buildings alone was credited to the Arboretum shortly before June 30, 1964, when the sum of \$14,806.69 was added to the principle of the Bussey Fund for the Arnold Arboretum (1903), for that portion of the net proceeds of the Bussey Institution land settlement. This transaction was not recorded in sufficient time to be included in the Director's Report of the appropriate fiscal year.

The Friends of the Arnold Arboretum renewed their gifts during the year, and these funds were assigned as usual to an account for work on the grounds in Jamaica Plain or for activities in the horticultural department and the greenhouses. We are grateful for the generous and loyal financial support of the Friends for the work of the staff. A record of the gifts is published quarterly in the "Gifts to Harvard," and the complete fiscal review is published annually in the Financial Report to the Board of Overseers of Harvard College.

Gifts of materials for the horticultural collections, the library, the herbarium, or special research purposes were many and have, in general, been noted in the appropriate section of this report. Special gifts included a collection of orchid plants from Mr. and Mrs. Robert Preston for research projects and for teaching; a number of plants or propagation materials

from the hollies of the late Wilfred Wheeler made possible through the Massachusetts Audubon Society; a large gift of special lily bulbs from the Ofuna Botanical Garden in Kanagawa-Ken, Japan; a very old and large *Taxus baccata* 'Adpressa' from Mr. Harry W. Fowle; a large number of books from the estate of Mrs. Susan McKelvey; many kinds of records



An old specimen of *Taxus baccata* 'Adpressa' prepared for transplanting to a location near the Dana Greenhouses in Jamaica Plain. This plant was the gift of Mr. Harry W. Fowle, shown in the photograph by Heman Howard.

and files from Mr. Seth Kelsey. We are grateful for these and smaller gifts of similar nature.

#### Publications:

Four numbers of the *Journal of the Arnold Arboretum* were issued during the fiscal year under the editorial direction of Dr. Schubert. The numbers contained 462 pages and 21 articles, primarily by members of the staff. We welcome the first half of the series of letters from Charles Sprague Sargent to the Louisiana botanist, Reginald Somers Cocks, which have been edited by Professor Joseph Ewan of Tulane University. Publication of the remainder of the series of letters will be in the current volume of the *Journal*. The full series will be available as a single bound reprint.

Two large manuscripts were completed during the year and submitted for publication as independent studies. A cumulative index to the nine volumes comprising Urban's *Symbolae Antillanae* was prepared by Miss Sutton and Miss Carroll. It will be published in August by the Arboretum. An encyclopedic bibliography of the medicinal and poisonous plants of



southeastern Asia was completed by Dr. Perry and is being considered by a private publisher.

Since volumes 1-10 of the *Journal of the Arnold Arboretum* have long been out of print and the supply of many single numbers has been exhausted, the available back numbers were sold during the year to the Kraus Reprint Corporation, 16 East 46th Street, New York, N.Y. 10017, under a contract to reprint the first twenty volumes and all out-of-print numbers, and to offer all for sale.

The bibliography which follows lists 76 articles and books by members of the staff which were published during the past fiscal year.

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RICHARD A. HOWARD, *Director*

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## Staff of the Arnold Arboretum

1964-1965

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IRVING WIDMER BAILEY, S.D., Professor of Plant Anatomy, *Emeritus*.

KARL SAX, S.D., Professor of Botany, *Emeritus*.

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GEORGE KONSTANTINE BRIZICKY, R.N.Dr., Botanist, Southeastern Flora Project.\*

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THEODORE ROBERT DUDLEY, Ph.D., Assistant Horticultural Taxonomist.

IAN KEITH FERGUSON, Ph.D., Botanist, Southeastern Flora Project.\*

ALFRED JAMES FORDHAM, Propagator.

PETER SHAW GREEN, B.Sc., Horticultural Taxonomist.

WILLIAM ED GRIME, B.A., Curatorial Assistant.\*

THOMAS GORDON HARTLEY, Ph.D., Assistant Curator.

HENRY BARNES HOSMER, LL.B., Research Associate.

HEMAN ARTHUR HOWARD, Assistant Horticulturist.

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DONALD WYMAN, Ph.D., Horticulturist.

\* Appointed jointly with the Gray Herbarium.

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